

REMARKS/ARGUMENTS

The above-identified patent application has been reviewed in light of the Examiner's Final Action dated November 13, 2008. Claims 1 and 19 have been amended, without intending to abandon or to dedicate to the public any patentable subject matter. Claims 2, 7, and 21-22 have been canceled herein and Claims 23-25 were previously canceled. Accordingly, Claims 1, 3-6, and 8-20 are now pending. As set forth herein, reconsideration and withdrawal of the rejections of the claims are respectfully requested.

Claim Objections

Claim 15 has been amended to read "*pulsator valves*" in order to maintain continuity of the claims as requested by the Examiner.

Claim Rejections - 35 USC § 112

The Examiner has objected claim 19 as failing to comply with the enablement requirements. Claim 19 has been amended to read:

"The sensor apparatus as claimed in claim 17 wherein milk abnormality is detected through a comparison between sensor output signals indicating the detected property of the milk extracted by an extraction element and an alternative extraction element or elements."

The claim has been amended to clarify the ratio as being formed by comparison of the detected properties of the milk which is extracted by the individual extraction elements. One skilled in the art would appreciate that the ratio of the properties of the milk, such as electrical conductivity, between extraction elements (and hence udder quarters or halves) is recognized as one of several possible methods for improving the estimate of mastitis status of the whole cow (Hamann and Zecconi, 1998).

One skilled in the art would read the specification and understand that providing an output signal and display which is representative of the ratio reading taken and compared with respect to the milk obtained from udder quarters or halves of the dairy animal involved would be a valuable tool in identifying milk abnormality.

Claim Rejections - 35 USC § 102

Swanson *et al.*

The Examiner has objected Claims 1, 2, 4-7 and 9 as being anticipated by Swanson *et al.* (US 4,344,385). Swanson *et al.* discloses an independent quarter milking device having four teat cups with individual conduits connected from the milking cups to a manifold mounted on the structure. Milk from the manifold flows through a pipe line and into a collection tank. Sensors are required in each individual conduit before the manifold in order to detect the flow rate of each quarter.

As previously maintained, this is contrary to the objectives of the current invention, which allows the use of a single sensor to detect a particular property of milk extracted from a plurality of extraction elements individually.

Claim 1 as presently amended reads:

"A sensor apparatus adapted to be used with milk extraction machinery, the milk extraction machinery including a plurality of extraction elements for connection to a dairy animal which when activated are adapted to deliver extracted milk from two or more extraction elements into a single collection line, the sensor apparatus including:

a sensor forming a serial extension of the single collection line, wherein the sensor is adapted to detect a particular property of the milk extracted, and

a controller configured to control the activation of the extraction elements during a pre-determined period of milking the animal such that the sensor is exposed to extracted milk supplied from only one extraction element or one pair of extraction elements at any one time,

wherein the sensor apparatus is configured to identify the detected property of the extracted milk with the extraction element or elements from which the milk was extracted."

We appreciate that the Examiner may have previously maintained that Swanson *et al.* discloses "*a sensor associated with the collection line*". In order to remove any potential ambiguity of the claims, the sensor apparatus of claim 1 now includes "*a sensor forming a serial extension of the single collection line*." Support for this amendment can be found in the patent specification on page 8, lines 14 - 17.

The sensor **21** of Swanson *et al.* does not form a serial extension of the single collection line **25**. Swanson describes that "*separate milk conduits 19 connect each of the chambers within*

a assembly of shut off valves 20 and milk flow sensors 21 mounted on a member 22 of the stalls. Short connectors 24 direct the milk from the flow sensors 21 to a manifold 25" (Swanson et al., column 2, lines 29 - 33).

This describes the system clearly considered to be inadvisable in accordance with teaching of the present specification, which reads within the background section that "...*the provision of multiple sensors would be a relatively expensive mechanism due to the costs of the multiple components used. The provision of multiple sensors or transducers will also require multiple calibration procedures or runs to be implemented frequently to ensure accurate results may be obtained from each sensor.*"

By providing a sensor forming a serial extension of the single collection line, only a single sensor is required to service multiple extraction elements and the costs associated with the purchase / maintenance / calibration of multiple sensors is not incurred.

Further, activation of the extraction elements in Swanson et al. is not controlled by a controller ". . . during a pre-determined period of milking the animal such that the sensor is exposed to extracted milk supplied from only one extraction element or one pair of extraction elements at any one time . . ." There is no discussion within Swanson et al. to suggest that the activation of the teat cups (extraction elements) is in any way connected to exposing the sensor to milk supplied from only one extraction element or pair of extraction elements. It is not the activation of the teat cups which prevents the mixing of the milk until the manifold, as disclosed in column 2 lines 39-40 of Swanson et al., rather it is the provision of separate teat cup lines - which exist in the majority of conventional milking systems world wide.

Swanson et al. is an example of a system contrary to the objectives of the invention as presently claimed. Applicants submit that the amended claim set is novel and inventive over the cited reference for at least the reasons discussed. Accordingly, reconsideration and withdrawal of the rejections as anticipated or obvious in view of the cited reference is respectfully requested.

Van den Berg et al.

The Examiner has also objected to Claims 1 - 3, 6 - 8 and 21 as being anticipated by Van den Berg, et al. (NL 1020805). As in the previous response, we will make reference to the equivalent US Patent No. 6686492 in providing this response.

Van den Berg *et al.* discloses a device for automatically milking an animal including at least two teat cups connected by individual teat cup lines to a common milk line for discharging milk being extracted by the tea cups. A common sensor is included in the common milk line. Van den Berg *et al.* discloses effectively two embodiments in which:

(a) The extraction elements (teat cups 1 - 4) are continuously activated. In each teat cup line 7 - 10 there is provided a secondary sensor (milk determining element 11 - 14) which indicates to a central computer that the milk is present in a particular teat cup line before entering into the common sensor **5**.

There is no discussion regarding the inclusion of "*a controller configured to control the activation of the extraction elements during a predetermined period of milking the animal such that the sensor is exposed to extracted milk supplied from only extraction element or one pair of extraction elements at any one time. . .*" as presently claimed.

As there is no control of the activation of the extraction elements the common sensor **5** of Van den Berg *et al.* may be exposed to milk from any combination of the extraction elements at any one time, rather than from "...only one extraction element or one pair of extraction elements at any one time."

(b) In the second embodiment a controlled valve 19 - 22 is disposed in each teat cup line 7 - 10 between the milk determining element 11 - 14 and the common milk line 6. The Examiner holds that both the teat cups 1 - 4 and controlled valves 19 - 22 may be interpreted as being the extraction elements of the present invention.

As argued in the previous response we disagree with this interpretation. The clear and plain understanding of the term 'extract' or 'extraction' is to pull or draw out. The teat cups 1 - 4 of Van den Berg *et al.* are correctly interpreted as being extraction elements; however, the distinct and separate devices of the controlled valves 19 - 22 merely block or allow the flow of milk in order to build a buffer quantity. They do not extract milk, and would be understood by a person skilled in the art to be a wholly separate and additional integer to the "extraction elements" of the present invention.

Again, Van den Berg *et al.* does not disclose "*a controller configured to control the activation of the extraction elements during the predetermined milking of the animal such that the sensor is exposed to extracted milk supplied from only one extraction element or one pair of extraction elements at any one time. . .*"

The additional controllable valves provide a point at which milk residue may accumulate - raising hygiene issues, or disrupting the flow of the milk as it passes by the valve. One skilled in the art would recognize that disruption of the milk flow is highly disadvantageous as it deteriorates milk quality and increases the likelihood of air being trapped in the milk, which also has an effect in the accuracy of the analysis of the milk by the sensor. Additional costs and points of mechanical failure are also introduced.

It is a clear advantage that the present invention does not require the use of valves or other such devices in the milk lines in order to enable the sensor to be exposed "*to extracted milk supplied from only extraction element or one pair of extraction elements at any one time. . .*"

Further, Van den Berg *et al.* describes a measurement system for use with an automatic milking machine such as a milking robot. The present invention may be implemented in conventional milking systems which use the milking claw arrangement, where short tubes lead from individual teat cups to a common cup and from there into a single collection line as shown in Figure 1. This is the system predominantly used on dairy farms world-wide, and requires greater robustness and flexibility of installation of a sensor than a milking robot. A milking robot will typically have a supporting framework for the teatcups on which the numerous components of Van den Berg *et al.* (milk determining elements, controlled valves) might be mounted. The present invention provides a more robust sensor apparatus which may be installed in the more hazardous environment of a conventional dairy farm, and therefore has a significant advantage over Van den Berg *et al.* For at least these reasons, the invention as presently claimed is novel and inventive over Van den Berg *et al.* Accordingly, reconsideration and withdrawal of the rejections as anticipated or obvious in view of the cited reference is respectfully requested.

Nordengren et al.

The Examiner has also objected to Claims 1, 2, 4-7, 9-12, 15, 16, 21 and 22 as being anticipated by Nordengren *et al.* (US 4,011,838). Nordengren *et al.* relates to a milking machine system for the variation of working vacuum or massage vacuum, including a common flow rate sensing device **14**.

Nordengren *et al.* does not disclose a sensor apparatus "*wherein the sensor apparatus is configured to identify the detected property of the extracted milk with the extraction element or elements from which the milk was extracted.*" In contrast, the specification of the present invention makes continual reference to the advantages in doing so, and discusses that the sensor apparatus provides:

". . .an indication of problems with specific quarters relatively easily, preferably due to the sampling of milk in isolation from such quarters.

The present invention may also be adapted to sample or analyze the foremilk produced from an udder quarter, again to improve the accuracy of results or measurements obtained.""

There is no discussion within Nordengren *et al.* to teach that the flow rate sensor **14** identifies the flow rate of milk passing through the sensor with the teat cup from which the milk was extracted. There is continual reference throughout Nordengren *et al.* to the measurement of the overall flow rate of milk in the units of kilograms per minute. This flow rate is used to determine the level of milking vacuum to be implemented in accordance with a pre-programmed series of phases. One skilled in the art would understand that the sensor of Nordengren *et al.* measures the flow rate of milk extracted by all of the teat cups, with no determination of the originating teat cup(s) by which milk flowing through the sensor was extracted.

One skilled in the art would recognize that the teaching of Nordengren *et al.* directs the reader to an apparatus for implementing a milking scheme involving the application of various levels of milking vacuum and sequential pulsation. It would not be obvious to identify the extraction element through which the milk flowing through the sensor was extracted, as there is no incentive to do so.

It is not an intent of Nordegren *et al.* "to control the activation of the extraction elements during a pre-determined period of milking the animal such that the sensor is exposed to extracted milk supplied from only one extraction element or one pair of extraction elements at any one time" as claimed by the present application. This is merely a by-product of sequential operation of the teat cups which is described in column 4 line 65, to column 5 line 2 as being "beneficial to the milking operation in several respects, such as resulting in even milk flow in the line, minimizing the risk of carrying over infection, suppressing air mixing into the milk, lowering free fatty acids, and controlling hydrolytic rancidity."

Further, Nordengren *et al.* maintains a priority date of 25 March 1976. The benefits in detecting a particular property of milk extracted from individual udder quarters or halves has been known for decades. Twenty seven years between this date and the priority date of the present application is a significant amount of time in the field of dairy sensing, and the prevalence of the milking claw arrangement during this time has meant that the problems addressed by the present invention are not new -with significant incentive to address these issues. It follows that the state of the art supports the novelty and inventiveness of the invention as claimed, especially with regard to Nordengren *et al.* For at least the reasons discussed, we hold that the invention as claimed is novel and inventive over Nordengren *et al.* Accordingly, reconsideration and withdrawal of the rejections as anticipated or obvious in view of the cited reference is respectfully requested.

As independent claim 21 has been cancelled herein from the present claim set, and the remainder of the claims depend from Claim 1 we believe the same arguments are equally applicable.

Claim Rejections - 35 USC § 103

The Examiner has further rejected Claim 13 as being unpatentable over Nordengren *et al.* in view of Rubino (US 4,572,104), Claim 14 as unpatentable over Nordengren *et al.* in view of Seabourne (US 6,170,434), and Claims 17-20 as unpatentable over Swanson *et al.* in view of Fullam *et al.* (US 200610124064). We believe the amended Claim 1 is novel and inventive over the cited references for at least the reasons discussed above. It follows that the dependent claims rejected under this section are allowable for the same reasons.

Based on the foregoing, Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,
SHERIDAN ROSS P.C.

By: /Erin A. Kelly/
Erin A. Kelly
Reg. No. 62,288
1560 Broadway, Suite 1200
Denver, Colorado 80202
Telephone: 303-863-9700

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